

Case of a Tumor at the Angle of the Jaw, with practical remarks.

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IN November, 1828, Mr. Cleveland, about twenty-eight years of age, consulted me concerning a tumor in his neck, which had caused much anxiety. He was stout, athletic, and at first sight apparently healthy; but on close inspection, it was obvious that a malignant disease was beginning to exert an influence upon his constitution. Complexion, sandy; hair, reddish-yellow; skin, rather fair: temperament, sanguine; circumstances which had led to the belief that his malady was of a strumous character; but the skin, although fair, was not the thin, delicate skin of scrofula. There was also too much volume, strength and firmness of muscle, for that complaint; and besides, he had had in his youth none of the affections indicative of it at that period of life. His business, lumbering and boating on the Erie Canal, had subjected him to all the hardships, irregularities, and probably many of the dissipation incident to that mode of living. About ten or twelve months prior to his calling on me, he began to feel uneasiness about the ear and angle of the jaw, which was imputed to a cold, and therefore not regarded; but continuing and becoming more troublesome, the part was examined, and some tumefaction and hardness, not very definite, were discovered. A physician was at length applied to, who advised the common remedies, and encouraged him to hope that the difficulty would probably go off on the return of warm weather. As the tumor steadily enlarged, in spite of all the remedies and applications which had been recommended and prescribed by the medical gentlemen whom he had consulted, a surgical operation was suggested as the only means by which it could be removed. By advisement he called on me for an opinion as to the practicability of such a measure, and also for its performance if deemed advisable. On examination I found a tumor about as large as a turkey's egg, which commenced high up and deep in the space between the ramus of the jaw and mastoid process, and continued to increase until it occupied the whole region, and extended down the side of the neck nearly two and a half or three inches below the angle: being about five inches in length. The upper portion of the tumor appeared to be fast; the lower could indeed be moved transversely, but not longitudinally; if the muscles were put on the stretch, the whole seemed to be fixed, or rather rendered much less movable. The patient did not recollect whether at any time it could as a whole be moved. With the point of the finger passed into the mouth by the side of the tongue and beyond the palate, the tumor could be distinctly felt bulging into the fauces;—also impressions made upon it from without; but no clearly ascertained movement could be perceived. By pressing the finger as firmly upon the intervening tissues as the patient could bear, and moving its point about, we were pleased to find that it carried them with it along the inner surface of the tumor, from which it was inferred that they did not adhere to it with much firmness. By this experiment, the thickness of parts between the tumor and fauces was pretty well ascertained, and also that the point of the styloid process protruded further into the throat on this, than on the opposite side, owing, doubtless, to the pressure of the tumor.* The patient thinks he does not hear well with that ear, and that the side of the mouth correspondent with the tumor, is less moist than the other;—looking into that cavity, no saliva is seen issuing from the stenoian duct when the jaw is moved; and besides, the pulpy mass exterior to the tumor, seems to move rather freely over its surface; circumstances thought to corroborate the opinion

* It was recollected that this sometimes happened in cases where there was no disease.

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that the parotid had been almost, if not quite, absorbed, and that the tumor had taken its place.

Although considerably conversant with tumors in that region, and somewhat practised in operations for their removal, this appeared to be the most formidable that had been presented to me with an appeal for an operation. I therefore desired time to study the case, and particularly to review the anatomy of the parts, and consider fully the relations which obtained between them and the tumor, advising the patient in the meantime, to live abstemiously, mainly on a vegetable diet, abstaining wholly from stimulating drinks, and keep his bowels open.*

Of the Nature of the Tumor.

Is it, as has been supposed, a strumous affection, or simply a tumefaction, chronic enlargement, or hypertrophy of the lymphatic glands in that region? Is it scirrhus, or rather, malignant? We shall not trouble the reader with a detail of the reasons, or reasonings, which were entertained in order to show what it was not, but proceed to mention briefly the principal considerations which led to the conclusion that it was malignant. 1. Its rapid growth. Notwithstanding the length of time that had elapsed since its commencement, its magnitude was deemed sufficient evidence of rapidity of growth. 2. Its fixedness. 3. Stony or woody hardness. 4. Insensibility on handling. 5. Occasional shooting, darting, lancinating pains.† 6. Frequency of pulse. 7. Appearance of countenance, which is concomitant with and indeed symptomatic of malignant disease, though apparently local. Conclusion: The disease is a scirrhus enlargement of a lymphatic ganglion, normally situated in the parotid gland, about equidistant from the angle of the jaw and its condyle;—its ramus and the mastoid process, which had by its enlargement and consequent pressure, caused the parotid itself, as has been suggested, to be nearly, if not entirely, absorbed.

Can it be removed by an Operation?

Having in a former communication laid it down as an axiom, that "every surgical operation should be based on the anatomy of the region which is the field of operative procedure," I feel myself bound (which is my apology), to detail rather minutely, the anatomical relations and connections upon which the operation about to be described was predicated and planned. The inferior extremity of the tumor inclines forward and even presses upon the larynx, consequently is exterior to the cornua of the os hyoides and thyroid cartilage, which lie between it and the facial, lingual, and superior thyroid arteries and the hypoglossal nerve; farther down it is separated from the primitive carotid, par-vagum and internal jugular vein by the deep cervical fascia and sheath which envelopes them. When the chin approaches the sternum this part of the tumor becomes more prominent laterally; and if the mouth be opened while the head is in that position, the lateral

* I am not much in the habit of preparing patients, as it is termed, for operations. Unless there is some disease other than that for which the operation is to be performed, the performance should, in my opinion, promptly succeed the decision to operate. On no occasion have I regretted following this rule.

† These sensations, or pains, are peculiar to the serous membranes. When complained of by patients, the practitioners should always suspect one of two things, viz: either that the cause is in a serous membrane, or in a part, as a gland for instance, which circulates red blood, but which is undergoing a change by which that is excluded, as in scirrhus and cancer. It should be also recollected that serous membranes, in their normal condition, exclude red blood, and are, therefore, insensible, like bone, cartilage, or any other structure which admits colorless fluids only. Each structure has a feeling peculiar to itself; an important consideration for the medical man.

prominence is increased, and forced back under the mastoid muscle, from which it was inferred, as the artery did not accompany this last movement, that there was no very intimate connection between it and the tumor. In deglutition, the tumor became likewise more prominent laterally, from the action of the digastric and stylo-hyoid muscles, by which the cornu of the os hyoides was made to ascend within the tumor, therefore it was not connected with the external carotid from the bifurcation, or with those muscles up to a level with their highest range of action. Thus far matters seemed to be favorable to an operation; but the state of parts above the muscles just named, was much more difficult to make out. The tumor fills the whole of that region, and consequently has a most intimate relation to and perhaps connection with its boundaries and contents, from which obstacles, formidable, if not insuperable, may arise. The solid parts which constitute the metes and bounds, the surgical landmarks of that region (i.e. above the posterior belly of the digastricus and stylo-hyoideus), are anteriorly, the angle, ramus, cervix condyle and zygoma;—posteriorly, mastoid process, transverse process of the atlas and the meatus auditorius externus:—internally, the styloid processes of the petrosum and sphenoides, and the “long rough ridge called processus vaginalis, just behind which and partially surrounded by it, is the styloid process” which, in most instances, extends from the root of the mastoid to a point opposite the styloid process of the os sphenoides.* The spaces between these solid structures are occupied by fasciæ, that complete the confines of this region which we denominate the parotid cavity. Externally, we have the fascia superficialis, and next, the fascia which comes off from the masseter muscle, one layer of which passes inside, and the other outside the parotid gland, around the margin of which they unite with one another and become firmly attached to the surrounding solids, viz: the angle, ramus and condyle of the jaw; the zygoma, glenoid cavity, meatus, and mastoid process.†

From the angle of the jaw a condensed portion of fascia passes upward, inward, and slightly backward to the styloid process, to which it firmly adheres. This constitutes what anatomists call the stylo-maxillary ligament;—also from the angle and ramus, a sheet of fascia (a part and parcel or prolongation of the last described) goes off, which covers the pterygoid muscles, and excludes them from the parotid cavity. It adheres to the external pterygoid process, and is perforated by the internal maxillary artery as it escapes from said cavity. The fold of fascia which forms the septum between the parotid and submaxillary gland extends from the angle of the jaw downward and backward to the anterior margin of the mastoid muscle to which it adheres; it then takes a turn upward and backward, covering the os hyoides, digastric and stylo-hyoid muscles onward to the styloid process and “vertical crest,” from the anterior extremity of which it is extended to the styloid process of the os sphenoides. It adheres to the “vertical crest,” and also to the other osseous structures above named. From these points of attachment it stretches further upward along the meatus auditorius; but seems to be quite thin and in some subjects entirely wanting in the neighborhood of the cervix and condyle, not being there needed for the security of any important part.

* This “rough ridge” of Horner, and “vertical crest” of Cruveilhier, the writer has been in the habit of thinking of much practical importance. It forms the dividing line between the parotid cavity, and the internal carotid, internal jugular and nerves which accompany those great blood-vessels; all being posterior to it.

† It should be remembered that the parotid has no capsule of its own, and that, in the present case, owing to the absorption of that gland, these lamina, united by cellular substance, form a covering to the tumor.

The fascial arrangement just described forms not only the partition between the submaxillary and parotid; but the inner boundary of the parotid cavity, and consequently lies between the tumor and the internal carotid, internal jugular vein, nerves and muscles, and furnishes a barrier beyond which the surgeon's knife must not pass.* Not so with the external carotid, which passing within the digastricus and stylohyoideus, perforates this fascia just above them, and gets fairly into the cavity and wends its way up between the fascia and tumor about three quarters of an inch, where, in the normal state of the parts, it enters the substance of the parotid; it is this vessel with its branches in such fearful juxtaposition to the tumor, which gives us the most concern. Just at the above mentioned point where the artery enters the parotid gland, it divides into the internal maxillary and the temporal; the former goes off forward at a right angle; the latter passes up between the meatus and condyle, and escapes from the parotid cavity over the zygoma. If the conclusion that it is an enlargement of one of the lymphatic glands imbedded in the substance of the parotid be correct, what are its precise relations to the external carotid;—its branches;—and the portio dura? These glands† each enclosed in a capsule of its own, are situated near the place where the artery enters the substance of the parotid, and also where it divides into the internal maxillary and temporal. When one enlarges it forms for itself a sort of cyst of condensed cellular substance; compresses the parotid, and causes its absorption, and finally comes by degrees to take its place without assuming exactly the same relations to the arteries and nerves as obtained between them and the parotid in their normal state; still relations exist between them and the enlarged gland, which it is very important to ascertain and settle as far as practicable. As the lymphatics and lymphatic glands are in general more closely associated with the veins than with the arteries, and more especially so in the neck, it was inferred that the vein, which is normally anterior to the artery, lay between it and the tumor; that the latter, enveloped in and surrounded by a cyst formed of condensed cellular substance, lay anterior to both artery and vein, which would be found on its proximal or mesial side. This view is corroborated by the fact that the finger introduced deep into the throat could feel not only the tumor but the styloid process much more prominent and farther back than on the opposite side.

In Conclusion.

The circulation of the vessels in that region not being affected; nor the functions of parts supplied by the portio dura and branches of the trigemini disturbed in any appreciable degree, the opinion entertained was, that neither the vessels nor nerves were involved in or

* This fascia passes from the root of the mastoid inward and forward along the "vertical crest" to the styloid process, and still further along said crest separating the parotid cavity from the stylo-mastoid foramen, jugular ~~fossa~~ and foramen caroticum, at which point it sends off a process forward to the styloid process of the os sphenoides, which separates the glenoid cavity from the eustachian tube, thence onward to the external plate of the pterygoid process, thence to the ramus and neck of the condyloid process of the inferior maxillary bone, covering the pterygoid muscles and excluding them from the cavity. The portio dura penetrates this fascia between the roots of the mastoid and styloid processes; the external carotid pierces it, as has been stated, from beneath the stylo-hyoid and digastric muscles, just below and exterior to the styloid process.

Upon this arrangement of the fascia and its attachment to the styloid process and "vertical crest" of the petrous bone, and the consequent security which it affords to the vessels and nerves above mentioned, the writer based and promulgated in private and public lectures the opinion of the practicability of removing the parotid gland, long before it had been, to his knowledge, accomplished by an actual performance of the operation.

† In dissection we generally see but one, but there are more.

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compressed by the tumor, or very closely connected with it. If we avoid the principal arteries, shall we have hemorrhage from another source? The apparent circumscription and hardness of the tumor, taken in connection with the fact that the veins on the surface are but slightly varicose,* favors the idea that neither its own circulation, nor that in and with contiguous parts, is very active; consequently that the connection between it and them is slight;† therefore little or no hemorrhage from small vessels is to be apprehended, provided we keep close to the tumor, or as much as possible between its capsule and the cyst already mentioned.

Operation.

As the operation was almost exclusively based on the anatomy of the parts, the surgeon, who is an anatomist, will be able to anticipate nearly every step of its performance, therefore, the details of the plan, with the exception of the following points, will be omitted.

1. Injure the parotid gland as little as possible.
2. Dissect from below, upwards, and endeavor to gain the point of the styloid process near which the external carotid generally passes, and where it may be compressed or tied. As the proposition for tying the external carotid between the bifurcation and the digastricus is not, for reasons deemed conclusive, entertained, measures for securing it after emerging from behind that and the stylo-hyoid will be taken.
3. Be prepared to tie the common carotid.
4. Regard the direction of the external carotid, above the styloid process.
5. Find the transverse process of the atlas.
6. Preserve the trunk of the portio dura from lesion.
7. Tie, if necessary, and before dividing, if practicable, the internal maxillary artery;—also, the temporal.

The patient being laid upon a table of convenient height, with the ~~body~~ ^{head} inclined to the opposite side, and the chin slightly elevated, an incision was made through the integuments, which commenced over the zygoma, about half an inch in front of the condyle, and curving backward near the meatus and the mastoid process, extended down along the anterior margin of the mastoid muscle, to the side of the trachea, where it terminated an inch or more below the inferior extremity of the tumor.‡ A dissection an inch in length was made through the fascia to the surface (as was supposed) of the tumor

* Varicose and tortuous veins in the vicinity of indurated structures, as scirrhus, cancer, &c., are a sure sign of obstructed circulation within them, and also in the parts immediately surrounding them;—in structures softened by disease, it is an indication equally sure that the circulation is active.

† The fixedness of the upper portion of the tumor was regarded as arising from close contiguity of solid parts, rather than from strong adhesions to surrounding tissues. The freedom with which the lower jaw moved, although considerably restrained, seemed, however, to militate against this view.

‡ The reason for curving the incision backward and extending it to the trachea so far below the tumor, were, 1, to inflict the smallest possible injury on the parotid gland, if any of it remained, in order, to prevent salivary fistulæ, which authors tell us are so apt to follow wounds of the parotid, a contingency which the writer has never witnessed, although he has had occasion in a number of instances to make deep and extensive incisions in that body in operations for the removal of tumors from that region; but in no case has the discharge of saliva continued so as materially to interrupt the healing of the wound, much less produce fistula. 2. To raise the tumor from its bed by means of the convex flap.^a 3. To facilitate tying the common carotid, should that step be deemed necessary.

^a Frequently when a tumor has been laid bare by an incision half round its base, it may be lifted from its bed with little dissection, and turned back with the flap and peeled off with the fingers. I think this idea was derived (in 1815), from seeing a patient from whom Prof. J. C. Warren, of Boston, had removed a tumor by a curvilinear incision, since which the writer has been in the constant habit of planning his operations for the extirpation of tumors upon the principle of a flap operation, in all cases suited to that method of operating.

on its posterior side, into which a director was passed in contact with that surface, down to the termination of the incision; a knife run along its groove divided the platysma myoides and all the aponeurotic coverings; pressure being made on the cardiac side to prevent the admission of air into the external jugular, which must be necessarily severed by this movement. The director was again introduced and carried upward, and the parts lying over the face of the tumor in that direction divided in the same manner as near the meatus as could be well done. To ascertain whether the surface of the tumor had been positively reached, the point of the finger was pressed upon it and moved in different directions, by which it was shown that a layer of membrane (part of the cyst probably) moved with it, thereby proving that the tumor had not been actually exposed. This intervening membrane was pinched up, opened, and similarly divided through its whole extent. By pulling the flap, made as described, upward and forward, the lower extremity and posterior side of the tumor, *now absolutely denuded*, were raised from their position, and the work of detaching commenced. The fingers and handle of the knife were employed in separating and pushing along and away from the surface, the cellular substance, occasionally touching it with the edge when accumulated so as to prevent further progress without such application. The portions above mentioned were thus detached to a level with the angle of the jaw, and posteriorly a little higher. The flap, consisting of integument, layers of fascia, platysma myoides, remnant of the parotid, and part of the cyst, was separated by a few sweeping strokes of the scalpel, with its edge in contact with the tumor, and dissected from it as far forward as the angle and ramus, the tumor being at the same time forced downward and backward. By means of a large, strong hook its inferior extremity was further drawn out and back, and the process of detaching on this side continued inward, forward and upward, behind and within the angle,* and also the tumor, until the styloid process, and soon the external carotid could be felt passing over it at least three-eighths of an inch back of its point,† where we found, to our great satisfaction, that it could be compressed so as to stop the pulsation in its branches, and probably command the flow of blood through them; of the latter, however, we did not feel quite assured, as Mr. John Bell tells us that stopping the pulsation of an artery did not obstruct the flow of blood through it so as to prevent hemorrhage, which accords with the writer's experience when large arteries are concerned.‡ Being able, as was hoped, to command or control the external carotid, we proceeded to dissect cautiously along the mastoid muscle and process towards the meatus, in doing which the integument sustaining the lobe of the ear was raised and turned back, so that the line of separation went from the process to‡ and past the

* The relative distance between the angle and styloid was considerable, owing to the fact that none of the molar teeth in either jaw had been extracted. Both teeth and jaws were amply developed.

† This artery almost always passes near the point of the styloid, but sometimes it varies, as in the present instance, in which this irregularity was remembered, and the caution predicated upon it exercised. In prosecuting this dissection the stylo-maxillary ligament was rather indiscreetly trepanned upon (perhaps divided); but sometimes "our indiscretions serve us well," and so it proved in this case, as will be seen in the sequel.

‡ Since writing the above I have heard Dr. Mott, who is daily unfolding the vast robe of his professional experience, express, in one of his lectures, an opinion adverse to that of Mr. Bell. I am aware that every observation of the Professor is entitled to great consideration; but if I do not misremember, I have seen, in one instance at least, and I believe two, the blood flow from the femoral artery in a stream which would have soon caused death, when all pulsation in the arteries below had been suspended by the pressure of the tourniquet. I also noticed, that in color, it resembled venous blood. A curious fact.

meatus. In the vicinity of the transverse process of the atlas great care was taken to avoid the occipital and posterior auris and the other great bloodvessels and important nerves which lie on its mesial side, within half an inch of its extremity, not forgetting the trunk of the portio dura as the dissection advanced. As the tumor seemed to fill the whole space, and moreover to be firmly adherent, much difficulty was experienced in accomplishing this part of our task; but by keeping closely in contact with it, drawing and holding it as much forward as possible, and pushing the cellular substance away from it backward, with the handle of the knife, which was also moved along the surface (the edge being substituted, when the accumulation required), some progress was made. It was likewise attempted to force the handle of the knife upward, within and in contact with the inner surface of the tumor, and then carry it backward and around its posterior side; something was also gained in this way, yet less than was anticipated, owing to the circumstances just mentioned; but by acting alternately in this and in the other way; by pulling, pushing, cutting and tearing a little here and a little there, the tumor was somewhat loosened and detached, so as to enable us to pass the transverse process of the atlas and reach, nearly if not quite, the external carotid, the course of which is upward and backward, from where it emerges from behind the digastric and stylo-hyoid muscles. We could not, however, perceive its pulsation, and were therefore ignorant of its precise situation relative to parts which had been probably disturbed by the disease and operation.

Returning to the angle; an attempt was made to extend the dissection further up, along the ramus and cervix, and separate the tumor from them and the pterygoid muscles, and also reach the internal maxillary artery; but with little success, owing to the want of room and fixedness of the tumor; yet something was gained, for it was rendered more compliant. By separating a little here and a little there, the tumor became still more yielding, which now induced us to turn our attention to the upper and posterior side, in the vicinity of the zygoma, condyle and meatus; and there at first the prospect was more flattering; but as we proceeded, care being taken not to wound the temporal artery as it emerged from within and above the tumor, the firm in-wedging and strong adhesions of the tumor seemed to furnish almost insuperable obstructions. We were by this time able to ascertain that the cause of difficulty was a protuberance from the upper part of the main body of the tumor, which lay between the neck of the condyle and external pterygoid process anteriorly, and the meatus posteriorly, and apparently filled the whole space where the deep cervical fascia is deficient, protruding inward very much more than seemed compatible with the safety of the patient, or comfort and convenience of the operator. The dissection at the posterior part of the tumor was resumed, but with indifferent success; the portion filling the space above mentioned, remained undetached and immovable, and no room for prosecuting the dissection. What shall we do? as Mr. John Bell did, apply a ligature and cut away what we can with safety, and leave the remainder to slough off? or tie the external carotid and tear away the whole?

As the condyloid process was apparently the principal obstacle in the way of getting at the portion which defied all efforts at dislodgment, an assistant placed the fingers of one hand upon the angle, and forced it forward, and depressed the chin with the other; the effect of which was to remove the angle and condyle half an inch forward out of the way; and it is doubtful if that amount of space was ever more acceptable, or more highly appreciated than on the present occasion. How much of that result was attributable to the partial or entire division of the stylo-maxillary ligament, which also loosened the styloid process and

facilitated the introduction of the finger, &c., I will not pretend to say.* The tumor was forcibly drawn outward, while the cellular substance and connecting medium were sedulously pushed with the handle of the knife, in all directions, from the protuberance—the edge being not unfrequently applied. In this way the operation was prosecuted until the tip of the finger could be forced in behind the morbid part from below, and the handle of the knife from above, by which, and with other helps, it was wrenched out of its bed, and finally separated from the body by a few touches of the scalpel. On examining the scirrhus mass, we were gratified to find that the whole tumor had been removed. During and subsequent to the operation, some eight or ten small vessels were tied. The loss of blood was less than had been anticipated. The artery that bled most freely was probably the transversalis faciei, which was small, as had been predicted on account of the large size of the facial.† The wound being cleansed, the solid textures which we have denominated “the metes, bounds, and surgical landmarks of the cavity,” were made out; also the external and internal carotids; the occipital and temporal could be traced. The internal maxillary was not found, nor was it much looked for, inasmuch as it did not bleed. Every bleeding and pulsating point was sharply scrutinised and secured by ligature, if leakage was apprehended; the flap adjusted and confined in its place by sutures, straps, compresses, &c., and the patient laid in bed, with the head elevated, and the cold water dressing ordered to be applied in the course of several hours. From the paralysis of certain muscles of the face it was obvious that branches of the portio dura and trigemini had been divided. The palsy was less than might have been expected from the extent and character of the operation. That the trunk of the portio dura had not been injured, was shown by the fact that few parts supplied by that nerve were palsied. The operation, which was very painful and lasted more than an hour, was borne with great fortitude.

The wound, except about an inch at its lower extremity into which a pledget of lint had been inserted,‡ and at the ligatures, united by the first intention. The pledget and also most of the ligatures came away at the first dressing; the whole speedily healed with apparent soundness, and the patient soon left rejoicing in the supposed cure. Painful as it may be, the reverse of this picture must be exhibited. In about three months a thickening, soft and quaggy, was perceived in that region, which continued to increase until ulceration of a horrible character ensued:—Profuse discharge of ill-conditioned matter, with frequent hemorrhages, exhausted and destroyed the unfortunate man.

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* Should I again be similarly circumstanced, I would run a probe-pointed bistoury down to the angle, and there in close contact with the bone, divide the stylo-maxillary ligament.

† I believe it always holds true that the transversalis faciei is small when the facial is large, and vice versa, when the latter is small the former is large.

‡ After amputations and other operations, I generally resort to that expedient, to prevent union by the first intention in the most depending part of the wound. The retention of serum, blood, or even pus, which may have been effused or secreted in portions of the cavity where union by the first intention may not have taken place, is thus obviated. By omitting this precaution, I have known extensive abscesses form in a stump, and after other operations, which not only delayed the cure, but greatly enhanced the suffering and danger of the patient. The application of the water, by keeping the dressings moist, facilitates the escape of fluids from within, in addition to other advantages which result from its use. To give time for the plasters to become well set, its application should be deferred for some two or three hours.

P. S. I have known another case very like the one just reported, but much less formidable at the time of the operation, which was as quickly followed by a similar result. In both, the primary tumors were scirrhus;—the subsequent, encephaloid.

Drs. Pomeroy, Burge, Main, and Crossman, with a number of medical students, were present and assisted at the operation.